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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
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09/198,376 11/24/98 OKAMOTO

A NU-98035

QM02/1215

EXAMINER

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ART UNIT	PAPER NUMBER
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3743

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DATE MAILED:

12/15/99

**Please find below and/or attached an Office communication concerning this application or proceeding.**

**Commissioner of Patents and Trademarks**

## Office Action Summary

Application No. 09/198,376	Applicant(s) Okamoto, et al.
Examiner Allen J. Flanigan	Group Art Unit 3743

Responsive to communication(s) filed on \_\_\_\_\_

This action is FINAL.

Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under Ex parte Quayle 35 C.D. 11; 453 O.G. 213.

A shortened statutory period for response to this action is set to expire 3 month(s), or thirty days, whichever is longer, from the mailing date of this communication. Failure to respond within the period for response will cause the application to become abandoned. (35 U.S.C. § 133). Extensions of time may be obtained under the provisions of 37 CFR 1.136(a).

### Disposition of Claim

Claim(s) 1-29 is/are pending in the application.

Of the above, claim(s) \_\_\_\_\_ is/are withdrawn from consideration.

Claim(s) \_\_\_\_\_ is/are allowed.

Claim(s) 1-29 is/are rejected.

Claim(s) \_\_\_\_\_ is/are objected to.

Claims \_\_\_\_\_ are subject to restriction or election requirement.

### Application Papers

See the attached Notice of Draftsperson's Patent Drawing Review, PTO-948.

The drawing(s) filed on \_\_\_\_\_ is/are objected to by the Examiner.

The proposed drawing correction, filed on \_\_\_\_\_ is  approved  disapproved.

The specification is objected to by the Examiner.

The oath or declaration is objected to by the Examiner.

### Priority under 35 U.S.C. § 119

Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

All  Some\*  None of the CERTIFIED copies of the priority documents have been

received.

received in Application No. (Series Code/Serial Number) \_\_\_\_\_

received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

\*Certified copies not received: \_\_\_\_\_

Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

### Attachment(s)

Notice of References Cited, PTO-892

Information Disclosure Statement(s), PTO-1449, Paper No(s). 8

Interview Summary, PTO-413

Notice of Draftsperson's Patent Drawing Review, PTO-948

Notice of Informal Patent Application, PTO-152

-- SEE OFFICE ACTION ON THE FOLLOWING PAGES --

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The disclosure is objected to because of the following informalities: It contains numerous grammatical and idiomatic informalities, apparently as a result of the translation from the priority document. For example, the sentence in line 18 of page 1 ("including movable portion and therefore bulky and heavy").

Appropriate correction of these informalities is required.

The specification also refers to material having a "property of metal" and a "property of an insulator". It is not clear what sort of properties are being referred to; electrical conductivity and insulating ability? Please clarify what properties are being referred to.

Claims 1-29 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Because of the use of the terminology objected to above in the independent claims, wherein it is not clear what the terms "property of metal" and "property of an insulator" are supposed to mean, it is not possible to ascertain with any degree of certainty what the claims are supposed to cover.

The expected properties as disclosed in the specification are understood well enough to permit a comparison with the prior art, as follows:

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-4, 7, 8, 11-13, 16, 17, 20, and 25-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combined teachings of Teeg et al. and Benson et al.

Teeg et al. show that it is known to use thermochromic coatings, i.e. coatings which change radiation properties as a function of temperature, to control spacecraft temperature. Teeg et al. cleverly employ a material whose transmissivity changes as a function of temperature, such as vanadium dioxide, and combine it with a highly reflective layer to deal with the problem of protection against incident solar radiation (much like applicant's protective coating or layer of silicon or germanium). Benson et al. show that it is also known to provide a similar thermally responsive effect utilizing a material which exhibits a change in emissivity as opposed to transmissivity, such as vanadium oxide, by coating it on a surface (see column 13 of Benson et al.) from which heat is meant to radiate more or less depending on the temperature of the surface. Although Benson et al. do not discuss applicability to outer space applications (where the vacuum provided between the facing layers would not, of course, need to be artificially produced), Teeg et al.'s teaching that thermochromic coatings can be used for temperature control in spacecraft applications would clearly suggest to one of

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ordinary skill in the art that Benson et al.'s technique could be used to control temperature in a spacecraft.

Regarding those claims which recite specific materials, in general the substitution of one known material for another is obvious. Benson et al. clearly indicate that vanadium oxide is but one example of a suitable material, and list others which would work. Clearly, any material known to exhibit thermochromic properties at the desired temperatures would be obvious to use. It is presumed that the materials recited by the applicant are known materials, whose properties are also known. Their use as material for thermochromic coatings would thus have been obvious.

Regarding those claims which recite specific techniques of coating, these techniques such as powder coating, using a binder, crystal growth adhesion, etc. are all deemed to be well known methods for applying coatings to substrates, to the effect that citation of a reference to such effect is deemed unnecessary. *In re Malcolm*, 54 U.S.P.Q. 235.

Claims 5, 6, 9, 10, 14, 15, 18, 19, and 21-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Teeg et al. in view of Benson et al. as applied to claims 4, 8, 13, 17, and 20 above, and further in view of Amore.

As indicated above, a thermochromic coating with variable emissivity cannot by itself successfully control temperature when it may be subject to solar radiation, as recognized by Teeg et al. The embodiment of the instant application which does not

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employ a protective silicon or germanium coating would suffer the same drawback. As recognized in Teeg et al., incident solar radiation should be reflected back into space when not needed. However, when emissivity is high, reflectivity is low, so a surface attempting to emit heat which is being bombarded by solar insolation would be unable to reflect a great percentage of radiation. Amore et al. teach that it is known to use silicon or germanium coatings to protect spacecraft components from solar radiation. The coatings reflect light in the visible portion of the spectrum (radiation corresponding to the temperature of the sun), but allows transmission of emitted radiation in the infrared wavelengths (corresponding to the temperature typical of satellites) "to aid in controlling temperatures". In view of this, it would have been obvious to one of ordinary skill in the art to supplement the thermochromic coating of Benson et al. with such a layer when used in an outer space application to protect from sunlight radiation while allowing the emission of infrared rays for cooling when needed.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

The Kokai to Okamoto (one of the current applicants) discloses the use of a thermochromic material applied to the inside surface of a satellite, although the description of how it operates provided in the English abstract obtained is somewhat confusing (it seemingly reverses the temperature dependent properties of vanadium

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oxide as disclosed in Benson et al.). The Examiner would appreciate the submission of any translation of or English language equivalent to this document if available to the applicants.

Any inquiry regarding this or a previous communication from the Examiner should be directed to **Allen J. Flanigan** at telephone number (703) 308-1015. The Examiner can normally be reached Monday through Friday from 9:30AM until 6:00PM. Documents may be Faxed to the Examiner's Attention at (703) 308-7764.

**A. FLANIGAN**

**Allen Flanigan**  
**Primary Examiner**

12/12/99